

Left atrial phasic function in heart failure with preserved ejection fraction: cardiac magnetic resonance myocardial feature tracking, invasive hemodynamics and outcome

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Background: Global left atrial (LA) size and function have been shown to be associated with adverse events in heart failure with preserved ejection fraction (HFpEF). The mechanism of coupling from left heart failure to pulmonary circulation is still controversially discussed.

Purpose: To study the prognostic most relevant determinant of LA size and function and its backward and forward interplay.

Methods: 188 HFpEF patients were prospectively enrolled and underwent baseline clinical assessment, cardiac magnetic resonance imaging (CMR) and invasive hemodynamic assessment. Coronary artery disease was ruled out by coronary angiography. 92 patients were in atrial fibrillation (AF), 96 in sinus rhythm. LA size and function were assessed by CMR including LA strain imaging by myocardial feature tracking (Figure 1A & B).

Results: Patients in AF had more pronounced dilatation of all phasic LA volumes and reduction of all phasic LA functions when compared to sinus rhythm (each $p < 0.001$ respectively).

After 31 (9–57) months 66 patients reached the combined endpoint defined as combination from hospitalization due to heart failure and cardiovascular death. In AF no atrial functional or volume parameter was correlated to out-

come. In contrast in sinus rhythm several phasic LA volume and functional parameters were associated with outcome. After multivariate cox regression analysis only reduced total LA ejection fraction and conduit strain rate were still predictive for worse outcome ($p = 0.031$ and < 0.001 respectively). After adjustment for known risk factors in HFpEF like age, six minute walking distance (6MWD), systolic pulmonary artery pressure (sPAP) and right ventricular ejection fraction as derived by CMR only impaired LA conduit strain rate remained predictive for cardiovascular events ($p = 0.001$). In contrast to LA booster pump function LA conduit function parameters were significantly correlated to reduced 6MWD (Figure 1C) and coupled backwards to pulmonary vasculature via correlation to sPAP and pulmonary vascular resistance (PVR) but without coupling to CMR derived elevated LV extracellular volume and left ventricular end diastolic pressure.

Conclusion: Total LA ejection fraction plays a key role in the prognosis of HFpEF. This effect seems to be mainly related to its LA conduit function but not to LA booster pump function. LA conduit function correlates to impaired 6MWD, sPAP and PVR.

